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[FAD 19: Dairy Products and Equipment]

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SPECIFICATION FOR STAINLESS STEEL MILK PIPES AND FITTINGS

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SPECIFICATION FOR STAINLESS STEEL MILK PIPES AND FITTINGS

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Indian Standard

SPECIFICATION FOR STAINLESS STEEL MILK PIPES AND FITTINGS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 11 August 1965, after the draft finalized by the Dairy Industry Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 This standard has been prepared on the basis of the International Dairy Federation Standard FIL-IDF 14 : 1960 'Milk pipe fittings'. The International Dairy Federation Standard is inch based, though their metric equivalents have also been given therein side by side. However, in this standard the dimensions have been given only in metric values as given in the International Dairy Federation Standard.

0.3 These pipes and fittings can also be used in other food processing industries if the material specified in **2.1** does not chemically react with food to be processed.

0.4 The expanding instructions for stainless steel pipe fittings given in Appendix A are intended as a guide for the expanding operations.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements for milk pipes and milk pipe fittings made of stainless steel for use in the dairy industry. The pipe fittings and components are of two types suitable either for welding to the tube or for attachment to the tube by expanding.

---

*Rules for rounding off numerical values (*revised*).

2. PIPING

2.1 Material — The pipes shall be made of stainless steel of composition corresponding to Designation 04Cr19Ni9 or 04Cr19Ni9Ti20 or 05Cr18Ni11M03 of IS : 1570-1961*.

2.1.1 The pipes shall be cold-drawn seamless tubes or welded and drawn tubes. They shall be softened, descaled and pickled; polished internally or externally or on both sides, as required.

2.2 Outside Diameter

2.2.1 The outside diameter of the stainless steel pipes shall be the following:

25·4 mm
38·1 mm
50·8 mm
63·5 mm
76·2 mm

2.2.1.1 The tolerances for pipes shall be as agreed to between the manufacturer and the purchaser.

2.2.2 *Freedom from Defects* — The pipe shall be clean, smooth and free from surface defects or longitudinal grooving internally and externally. The pipes shall be straight, cylindrical and of uniform thickness.

3. FITTINGS

3.1 Material — All the components of the range of fittings, except for the seal (*see* **3.6**), shall be made of stainless steel of composition corresponding to Designation 04Cr19Ni9 or 04Cr19Ni9Ti20 or 05Cr18Ni11M03 of IS : 1570-1961*.

3.2 Male Parts, Liner, Nut and Seal

3.2.1 *Expanded Type Male Part and Liner*

3.2.1.1 The expanded type male part shall be as shown in Fig. 1.

3.2.1.2 The expanded type liner shall be as shown in Fig. 2.

3.2.1.3 Both these components shall be suitably grooved internally to give adequate strength in attaching to the tube. A satisfactory grooving is illustrated in Fig. 3.

3.2.1.4 For external thread *see* **3.5.1.**

3.2.2 *Welded Type Male Part and Liner*

3.2.2.1 The welded type male part shall be as shown in Fig. 4.

---

*Schedules for wrought steels for general engineering purposes.

3.2.2.2 The welded type liner (short liner) shall be as shown in Fig. 5.

3.2.2.3 For external thread *see* **3.5.1.**

3.3 Nut

3.3.1 The nut shall be as shown in Fig. 6.

3.3.2 It shall be noted that dimensions are given for a standard form of hexagonal nut but any other external shape such as a castellated or round form may be adopted, if desired, as this does not affect the operation of the standard union.

3.3.3 For internal thread *see* **3.5.1.**

3.4 Spanner — A suitable spanner for an hexagonal type of nut shall be as shown in Fig. 7.

3.5 External Thread (of Both Expanded and Welded Types) and Internal Thread

3.5.1 The thread shall be made in accordance with Fig. 8 and Fig. 9.

3.6 Seal

3.6.1 The seal which shall be moulded from a suitable grade of rubber of approximately 85° International rubber hardness shall be as shown in Fig. 10.

3.7 Bends and Tees

3.7.1 *Expanded Type Bends and Tees* — The expanded type bends shall conform to Fig. 11 and the expanded type tees shall conform to Fig. 12.

3.7.2 *Welded Type Bends and Tees* — The welded type bend shall be as shown in Fig. 13 and the welded type tee shall be as shown in Fig. 14.

NOTE 1 — The dimensions of the bodies of the bends and tees differ according to whether the fittings are to be attached by welding or by expanding, but in either case the length between one face and the centre line of the opposite fitting is the same.

NOTE 2 — The distance between one face and the centre line of the branch is exactly the same as the dimension of the bend and the total length of the tee is double that of the bend. The radius of the bends has not been specified.

3.8 All milk contact surfaces shall be polished by emery not coarser than 220 grit of IS : 715-1962*.

4. EXPANDING OPERATIONS AND TOOLS

4.1 The instructions regarding expanding operations and the necessary tools given in Appendix A are typical and for information only.

---

*Specification for coated abrasives, glue bond (*revised*).

APPENDIX A

(*Clause* 4.1)

INSTRUCTIONS FOR EXPANDING STRAIGHT PIPE OF 25·4 mm AND 51·8 mm DIAMETER AND 1·25 mm THICKNESS, AND 63 mm AND 76·2 mm DIAMETER AND 1·5 mm THICKNESS

A-1. TOOLS

A-1.1 A set of tools (*see* Fig. 19) consists of:

a) Base plate,
b) Torque wrench and sockets,
c) Clamp block (*see* Fig. 20),
d) Expander (*see* Fig. 21),
e) Split cutting ring (*see* Fig. 22),
f) Expander rollers (*see* Fig. 23),
g) Spigot locating ring and levers (*see* Fig. 24),
h) Pilot bush assembly (*see* Fig. 25 to 34), and
j) Spherical hexagonal head adaptor (*see* Fig. 35).

Hacksaw frame, suitable hacksaw blades, spanners for clamp block nuts, file, heavy duty electric drill 8·0 mm capacity and 1400-2600 rev/min complete with sleeve and disc pad, are also required.

A-2. PROCEDURE-LINERS AND MALE PARTS

A-2.1 Preparation — Bolt base plate to bench. Secure to base plate a clamp block of size required, counterbore for fitting towards front. If long lengths of tube are to be used, fit an adequate support to keep the tube level.

A-2.2 Cutting the Tube (*See* Fig. 15)

A-2.2.1 *Length Required* — Length required will be the distance between the two fittings to be connected, less 6·4 mm (twice the distance between the faces of the counterbore of a seal ring).

A-2.2.2 Mark tube to length required; when a liner is to be expanded, place nut, facing correctly, on tube. Slide tube through centre hole of clamp block. Fit split cutting ring in clamp block. Line up cutting mark on tube with face of cutting ring. Tighten clamp block.

NOTE — The ends of polished tube tend to be tapered; cut off tapered portion before marking off tube to length.

A-2.2.3 Cut tube with hacksaw. File end square against cutting-off ring. Remove ring.

A-2.3 Expanding (*See* Fig. 16)

A-2.3.1 Slide fitting over tube, spigot facing end of tube. Loosen clamp block and position fitting in its counterbore.

A-2.3.2 Adjust tube flush with spigot face, and then tighten clamp block. Check that the tube does not fall below the face of the spigot at any point.

A-2.3.3 Place spigot locating ring over spigot on fitting.

A-2.3.4 Insert expander through ring into tube.

NOTE — The expander rollers are to be lightly oiled and never used dry.

A-2.3.5 Set torque wrench to correct figure for tube size as specified in the following table. Apply wrench and rotate expander in a clockwise direction until wrench collapses:

Liner and Male Part Size	*Torque Wrench Setting*
mm	m·kgf
25·4	2·8
38·1	4·8
50·8	9·0
63·5	13·1
76·2	16·6

A-2.3.6 Release expander by opposite rotation.

A-2.3.7 Remove expander and spigot locating ring with levers supplied.

A-2.4 Facing-Off (*See* Fig. 17 and 18)

A-2.4.1 Insert pilot bush assembly into tube until large knurled sleeve is against face of fitting.

A-2.4.2 Hold knurled sleeve and rotate key in a clockwise direction until segment jaws grip. Using tube supplied on key handle, tighten grip.

A-2.4.3 Remove sleeve and key as one unit.

NOTE — The 25·4 mm size key has no handles and is only knurled.

A-2.4.4 Check that spindle is square with face of fitting.

A-2.4.5 Place 80 grit Abradisc on face of disc sleeve pad.

A-2.4.6 Lightly oil spindle projecting from tube, and slide disc sleeve on it. Rotate by hand to check freedom of movement.

A-2.4.7 Fit spherical hexagon head adaptor into chuck of power unit. Insert spherical hexagon head into disc sleeve and start power unit. Apply light pressure only to face of fitting in order to avoid overheating of Abradisc and motor. Always start and stop motor with hexagon head in contact with disc sleeve.

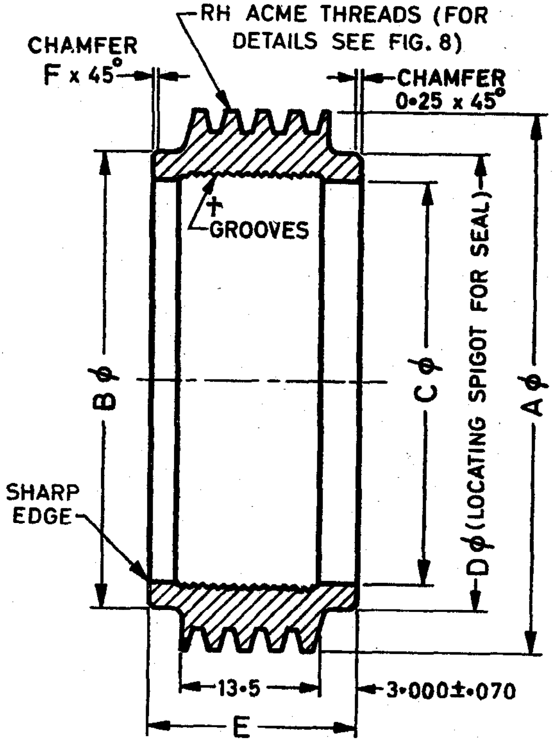
A-2.4.8 When the end of the tube has been ground back to the face of the fitting, replace the 80 grit with a 120 grit Abradisc and smooth off the faces of fitting and tube, removing as little as possible.

A-2.4.9 Release pilot bush assembly by means of knurled sleeve and key.

A-2.4.10 Clean off burrs and sharp edges.

A-2.4.11 Check that seal ring will fit over spigot and make a joint on face of tube, leaving at least 0·4 mm gap between steel ring and the back face of its spigot to allow for compression of the rubber.

A-2.4.12 Release clamp block and remove work.



†DETAILS OF GROOVES SEE FIG. 3

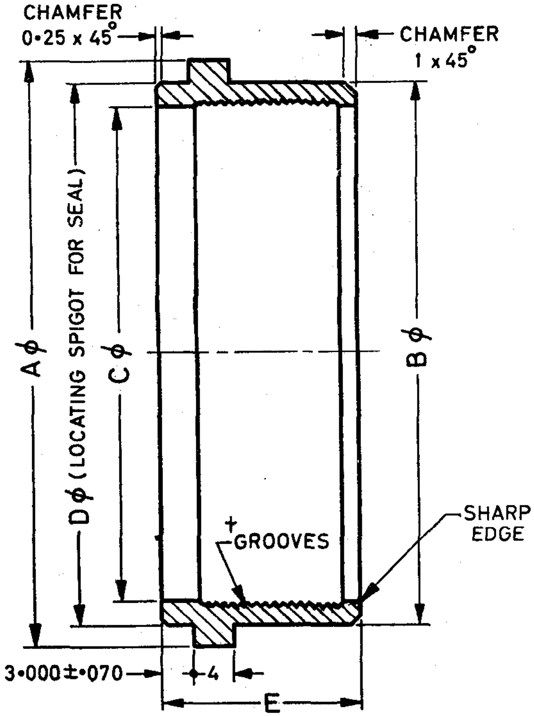
Outer Diameter of Pipe	A		B h10*	C D10*	D h10*	E	F
	Max	*Min*					
25·4	37·186	37·084	29·5	25·5	29·0	17·0	0·5
38·1	50·648	50·546	42·5	38·2	42·5	19·5	0·25
50·8	64·160	64·059	56·0	51·0	56·0		
63·5	77·673	77·572	69·0	63·5	69·7	25·0	1·00
76·2	91·186	91·084	82·0	76·3	82·3	30·0	

**See* IS : 919-1963 Recommendation for limits and fits for engineering (*revised*).

NOTE — Sizes corresponding to 38·1 mm and 50·8 mm only, are reversible on tube. For other sizes, the 3 mm deep locating spigot for seal to face end of tube.

All dimensions in millimetres.

FIG. 1 DIMENSIONS FOR EXPANDED TYPE MALE PART



+DETAILS OF GROOVES SEE FIG. 3

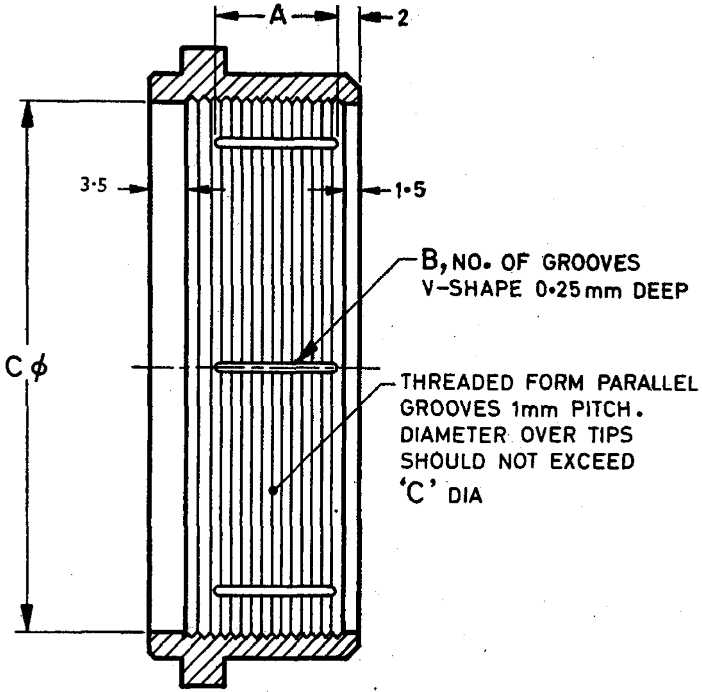
OUTER DIAMETER OF PIPES	*A* h10*	*B* h10*	*C* D10*	*D* h10*	*E*
25·4	33·8	29·5	25·5	29·0	17·0
38·1	47·0	42·5	38·2	42·5	20·0
50·8	60·5	56·0	51·0	56·0	
63·5	74·0	69·0	63·5	69·7	25·0
76·2	87·5	82·0	76·3	82·3	30·0

**See* IS : 919-1963 Recommendation for limits and fits for engineering (*revised*).

NOTE — For all sizes, the 3 mm deep locating spigot for seal to face end of tube.

All dimensions in millimetres.

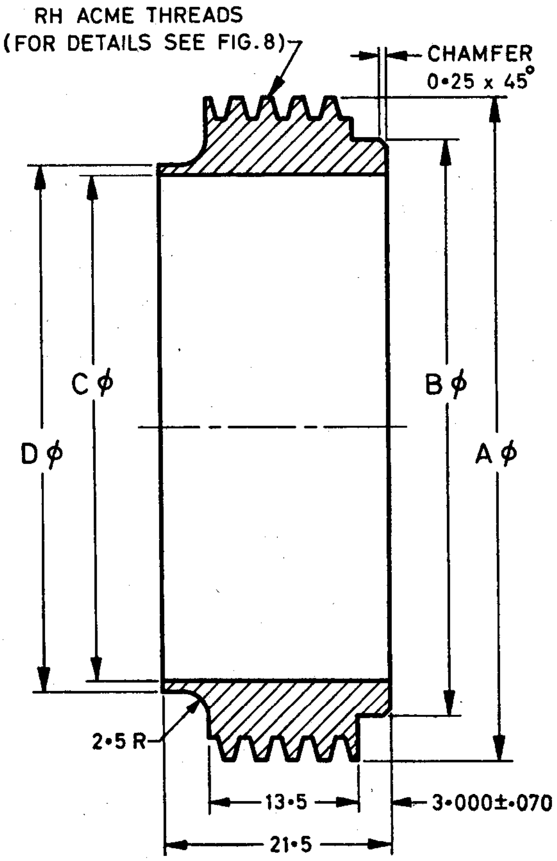
FIG. 2 DIMENSIONS FOR EXPANDED TYPE LINER



Outer Diameter of Pipes	*A*	No. of Grooves *B*	*C*
25·4	9·0	6	25·5
38·1	12·0		38·2
50·8			51·0
63·5	17·0		63·5
76·2	22·0	10	76·3

All dimensions in millimetres.

Fig. 3 Dimensions for Grooves for Expanded Type Fittings

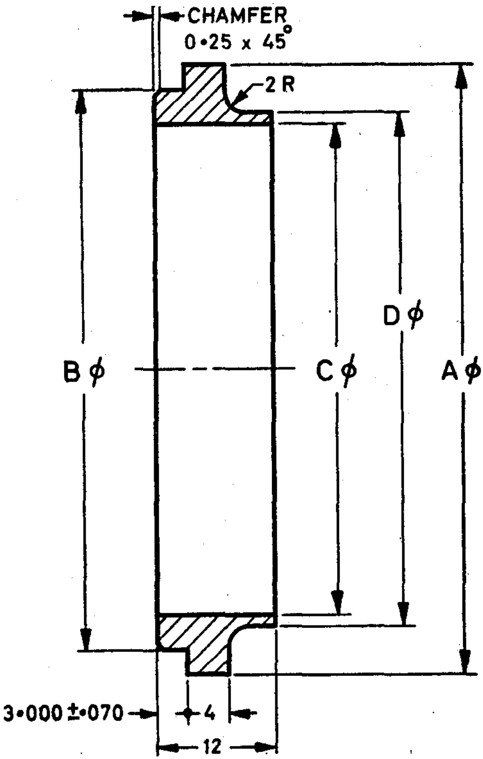


Outer Diameter of Pipes	*A*		*B* h10*	*C*	*D*
	Max	*Min*			
25·4	37·186	37·084	29·2	23·0	25·9
38·1	50·648	50·546	42·7	35·5	38·4
50·8	64·160	64·059	56·2	48·5	51·4
63·5	77·673	76·572	69·9	60·5	63·9
76·2	91·186	91·084	82·6	73·0	76·4

**See* IS : 919-1963 Recommendation for limits and fits for engineering (*revised*).

All dimensions in millimetres.

FIG. 4 DIMENSIONS FOR WELDED TYPE MALE PART

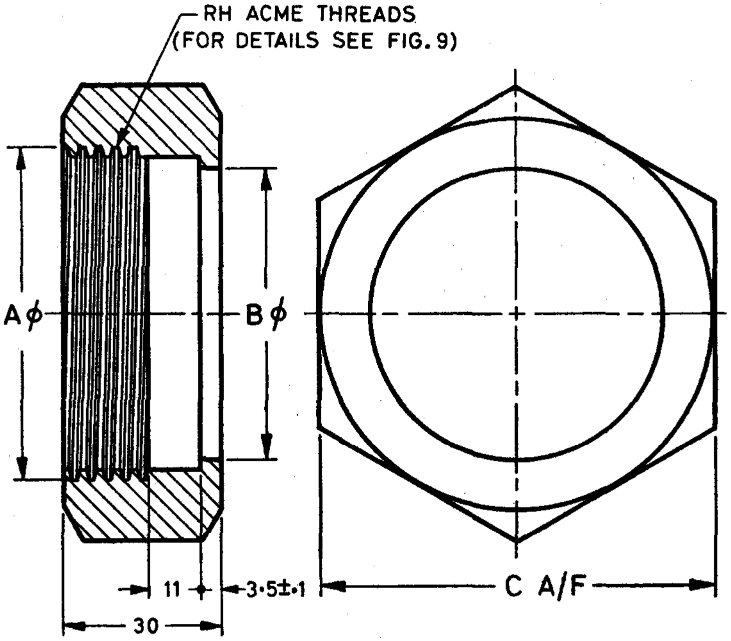


OUTER DIAMETER OF PIPES	*A* h11*	*B* h10*	*C*	*D*
25·4	33·8	29·2	23·0	25·9
38·1	47·0	42·7	35·5	38·4
50·8	60·5	56·2	48·5	51·4
63·5	74·0	69·9	60·5	63·9
76·2	87·5	82·6	73·0	76·4

**See* IS : 919-1963 Recommendation for limits and fits for engineering (*revised*).

All dimensions in millimetres.

FIG. 5 DIMENSIONS FOR WELDED TYPE SHORT LINER

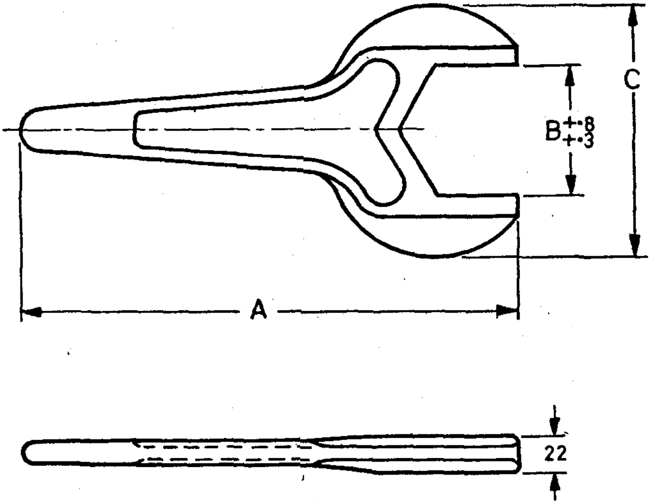


OUTER DIAMETER OF PIPES	*A*		*B* ·h11*	*C* +2% −0
	Max	*Min*		
25·4	38·125	38·049	30·5	46·0
38·1	51·638	51·537	43·5	61·0
50·8	65·151	65·049	57·0	76·0
63·5	78·664	78·562	70·0	91·0
76·2	92·177	92·075	83·0	106·5

**See* IS : 919-1963 Recommendation for limits and fits for engineering (*revised*).

All dimensions in millimetres.

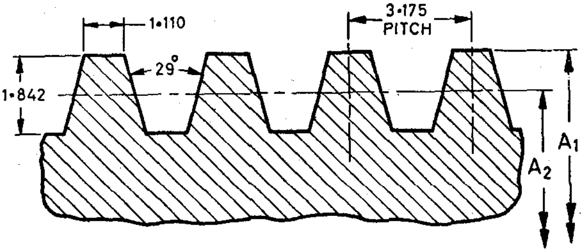
FIG. 6 DIMENSIONS FOR HEXAGON NUT



Outer Diameter of Pipes	*A*	*B*	*C*
25·4	248	46·9	102
38·1	286	62·2	124
50·8	305	77·5	149
63·5	337	92·8	162
76·2	365	108·6	175

All dimensions in millimetres.

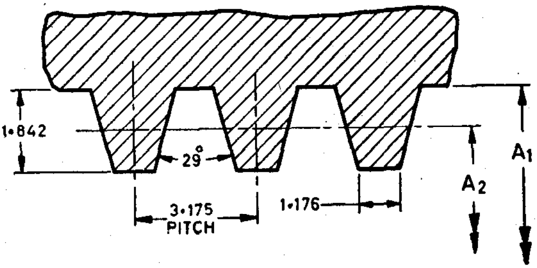
Fig. 7 Dimensions for Spanner for Hexagon Nut



Outer Diameter of Pipes	A_1		A_2	
	Max	*Min*	*Max*	*Min*
25·4	37·186	37·084	35·357	35·255
38·1	50·648	50·546	48·819	48·717
50·8	64·160	64·059	62·332	62·230
63·5	77·673	77·572	75·844	75·743
76·2	91·186	91·084	89·357	89·256

All dimensions in millimetres.

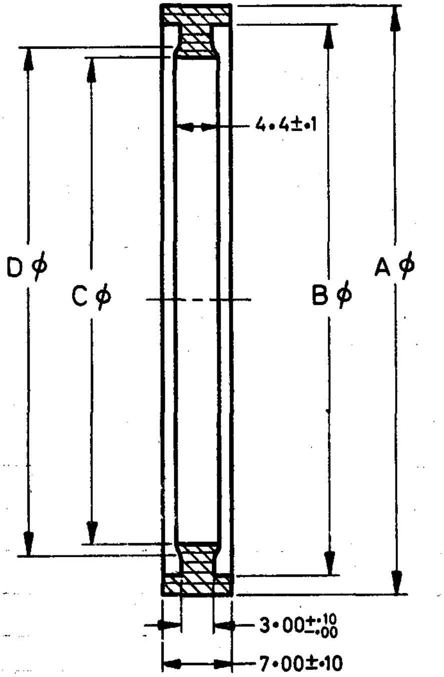
FIG. 8 DIMENSIONS FOR EXTERNAL THREADS



Outer Diameter of Pipes	A_1		A_2	
	Max	*Min*	*Max*	*Min*
25·4	38·125	38·024	36·017	35·916
38·1	51·638	51·537	49·530	49·428
50·8	65·151	65·049	63·043	62·941
63·5	78·664	78·562	76·556	76·454
76·2	92·177	92·075	90·068	89·967

All dimensions in millimetres.

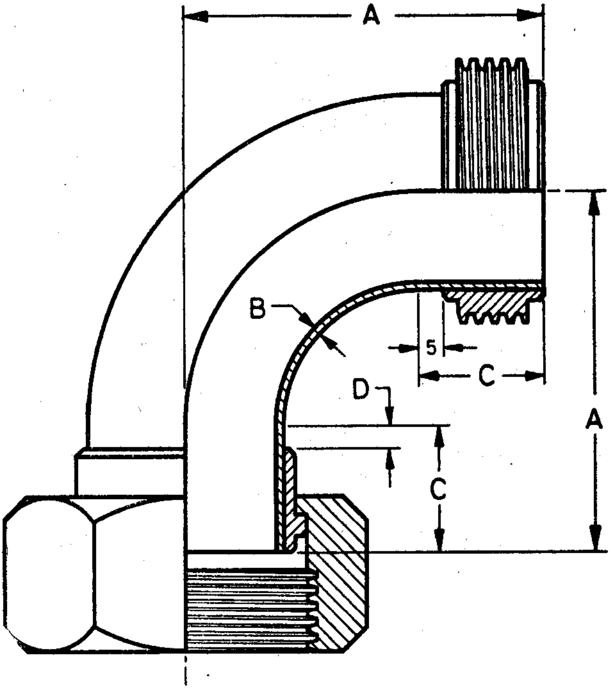
FIG. 9 DIMENSIONS FOR INTERNAL THREADS



Outer Diameter of Pipes	*A* +0 −0·25	*B* +0 −0·25	*C* +0·25 −0	*D* +0·25 −0
25·4	32·50	28·80	23·00	25·50
38·1	46·00	42·30	35·50	38·00
50·8	59·50	55·80	48·50	51·00
63·5	73·00	69·50	60·50	63·00
76·2	86·50	82·10	73·00	75·50

All dimensions in millimetres.

Fig. 10 Dimensions for Seal Ring

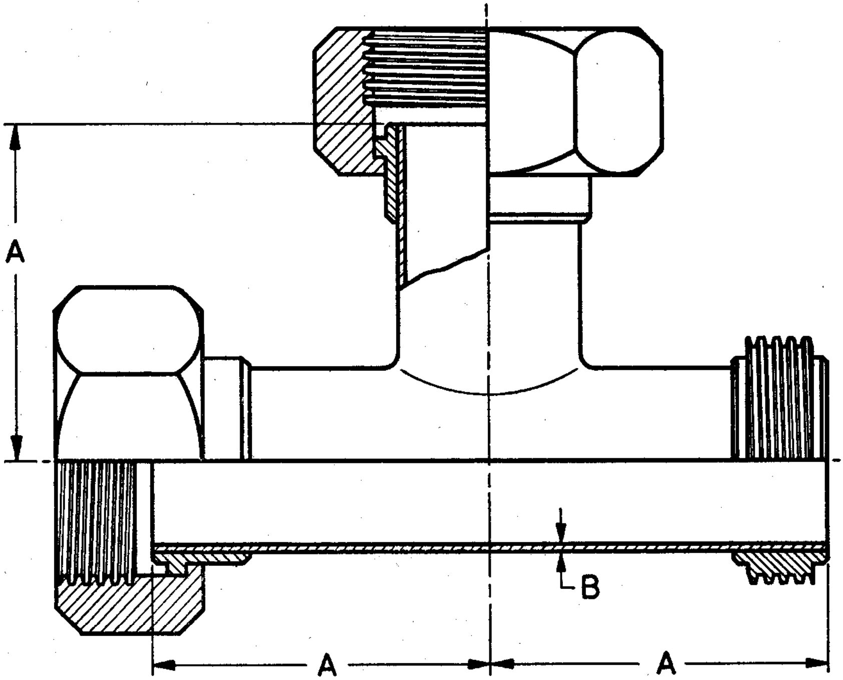


Outer Diameter of Pipes	*A* ±1	*B*	*C*	*D*
25·4	55	1·25	22·0	5·0
38·1	70		24·5	4·5
50·8	82			
63·5	105	1·50	30·0	5·0
76·2	110		35·0	

Note — Dimension *A* will remain constant for each appropriate size of bend irrespective of which combination of fittings are expanded to the ends.

All dimensions in millimetres.

Fig. 11 Dimensions for Expanded Type Bend



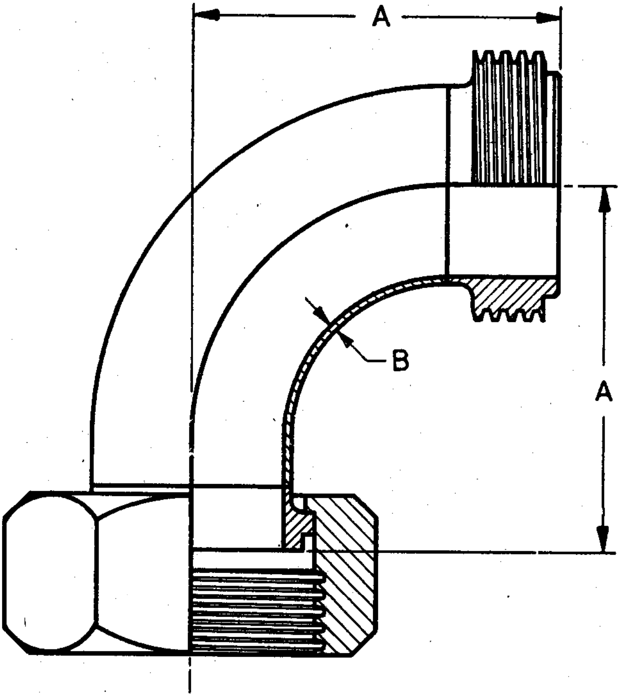
Outer Diameter of Pipes	*A* ±1	*B*
25·4*	55	1·25
38·1	70	
50·8	82	
63·5	105	1·50
76·2	110	

*Male parts only may be fitted on ends of tee corresponding to this size.

NOTE — Dimension *A* will remain constant for each appropriate size of tee irrespective of which combination of fittings are expanded to the ends.

All dimensions in millimetres.

FIG. 12 DIMENSIONS FOR EXPANDED TYPE TEE

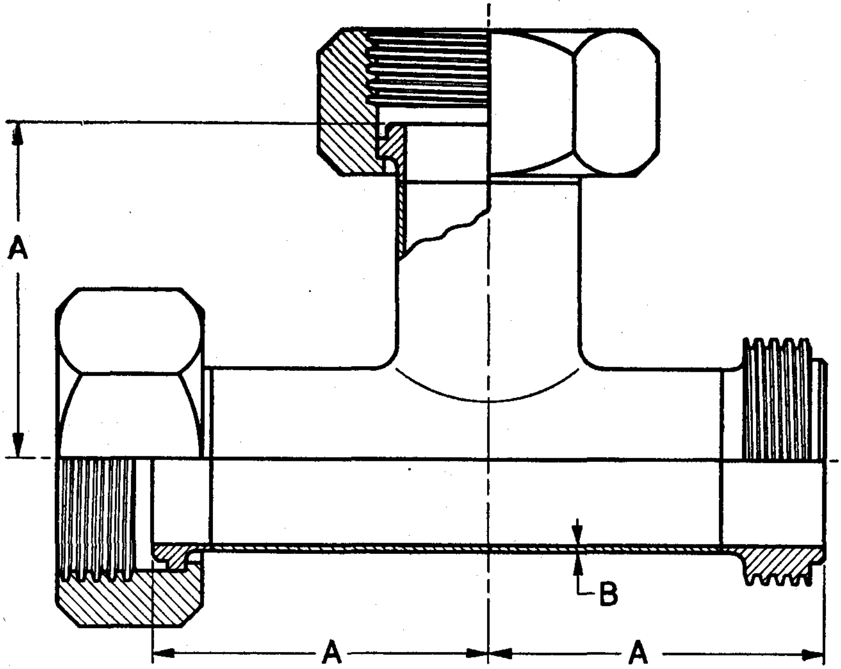


Outer Diameter of Pipes	*A* ±1	*B*
25·4	55	1·25
38·1	70	
50·8	82	
63·5	105	1·50
76·2	110	

Note — Dimension *A* will remain constant for each appropriate size of bend irrespective of which combination of fittings are welded to the ends.

All dimensions in millimetres.

Fig. 13 Dimensions for Welded Type Bend



Outer Diameter of Pipes	*A* ±1	*B*
25·4*	55	1·25
38·1	70	
50·8	82	
63·5	105	1·50
76·2	110	

*Male parts only may be fitted on ends of tee corresponding to this size.

NOTE — Dimension *A* will remain constant for each appropriate size of tee irrespective of which combination of fittings are welded to the ends.

All dimensions in millimetres.

FIG. 14 DIMENSIONS FOR WELDED TYPE TEE

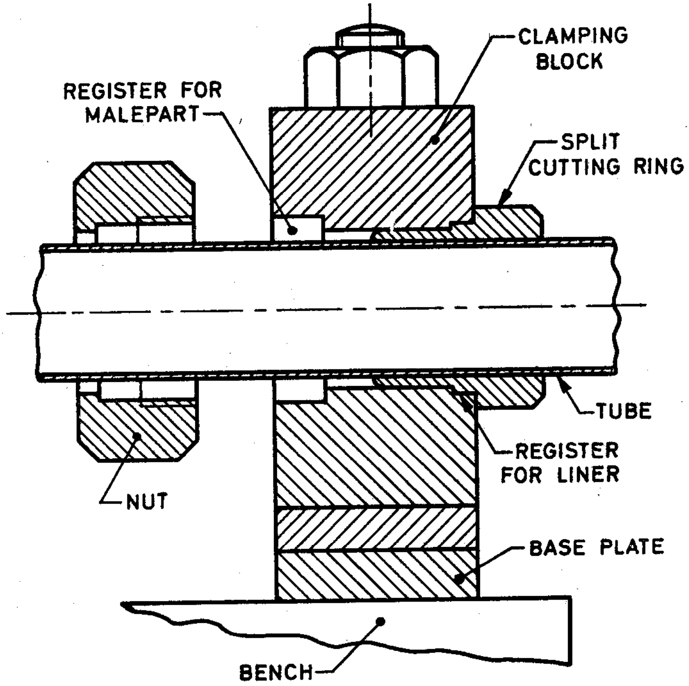


FIG. 15 OPERATIONS **A-2.2.2** AND **A-2.2.3** (AS FOR LINER) REVERSE CLAMPING BLOCK WHEN EXPANDING MALE PART

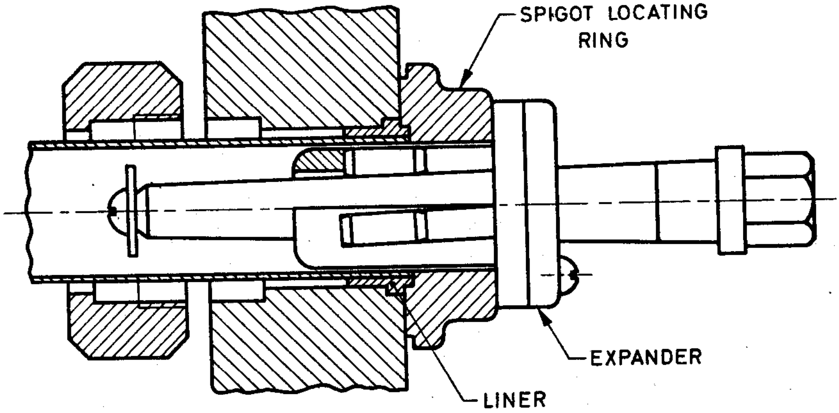


FIG. 16 OPERATIONS **A-2.3.1** TO **A-2.3.7**

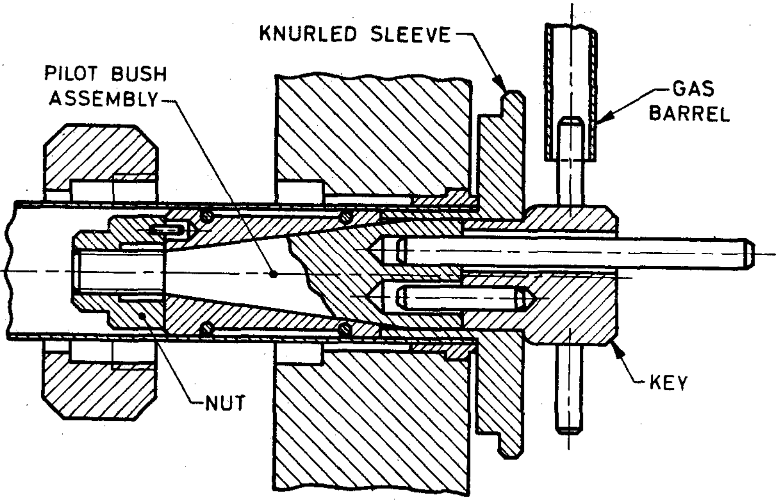


Fig. 17 Operations **A-2.4.1** to **A-2.4.4**

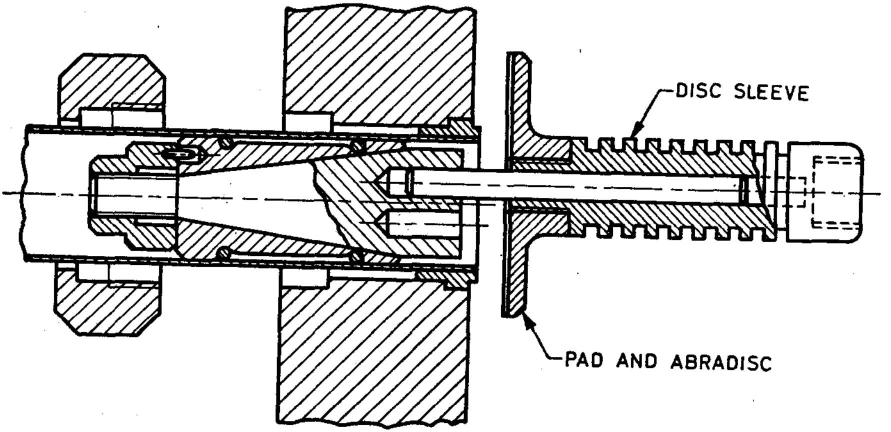


Fig. 18 Operations **A-2.4.5** to **A-2.4.12**

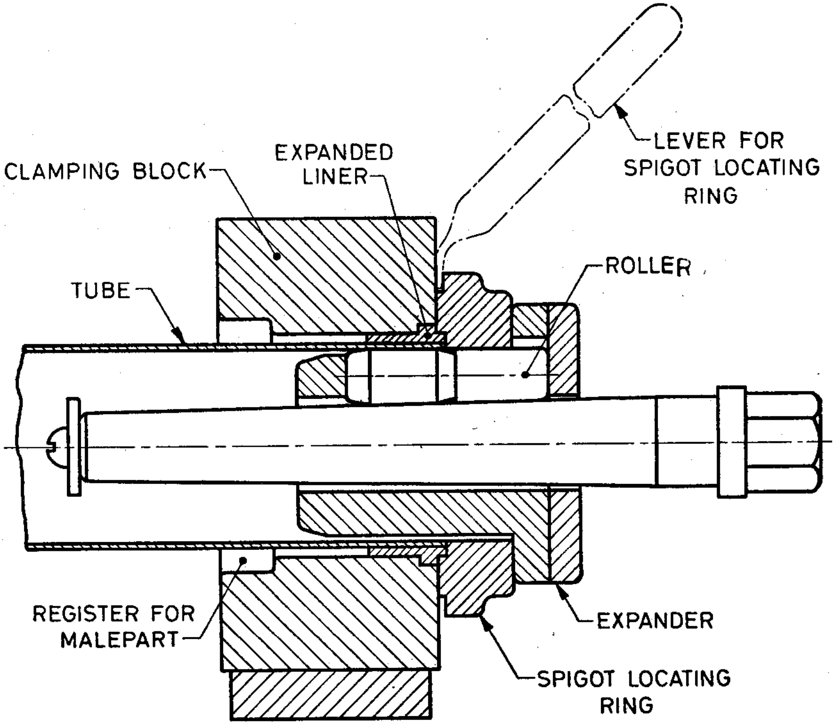
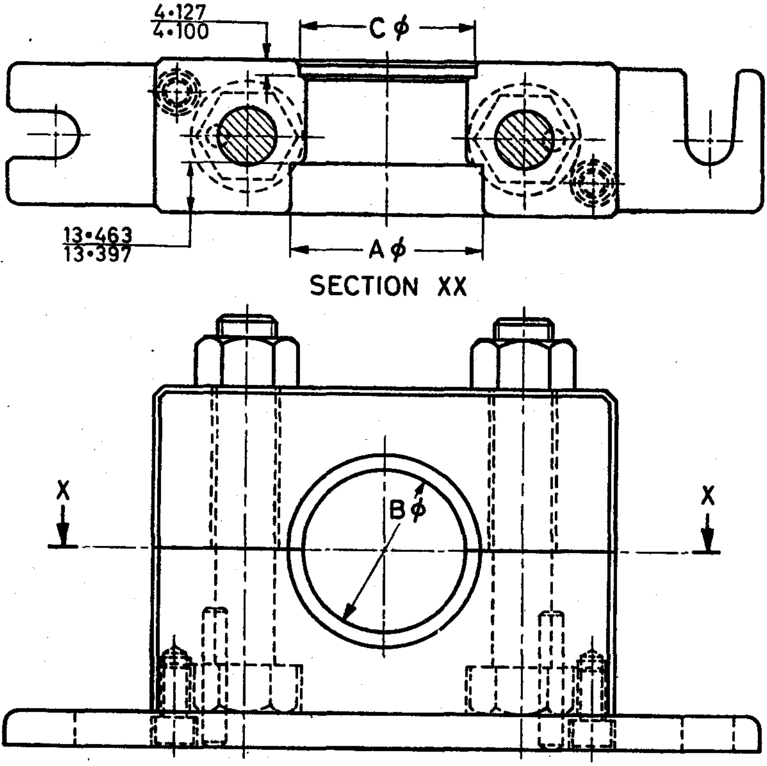


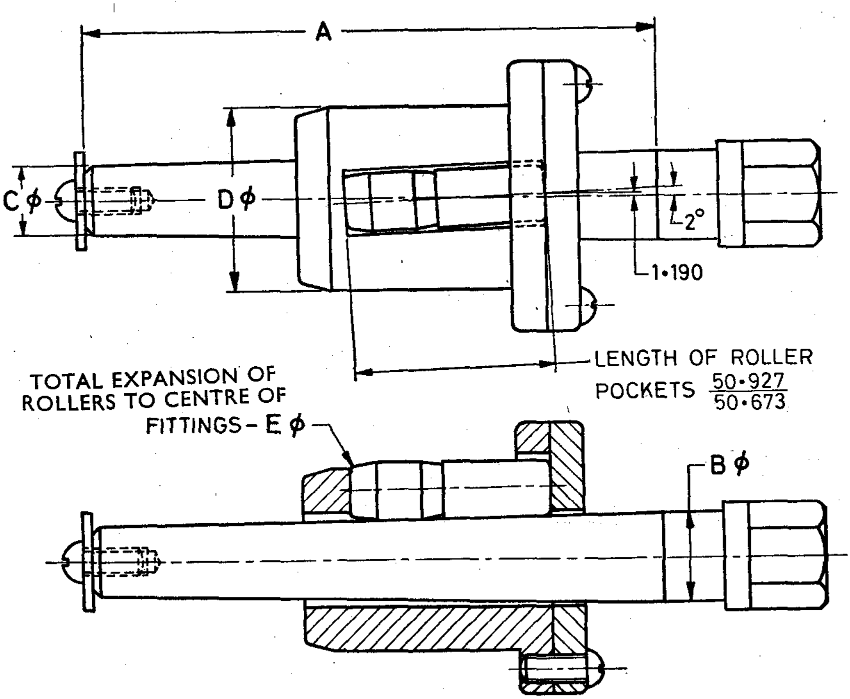
Fig. 19 Expanding Tool Assembly



Outer Diameter of Pipes	*A*		*B*		*C*	
	Max	*Min*	*Max*	*Min*	*Max*	*Min*
25·4	37·211	37·186	29·520	29·495	33·805	33·780
38·1	50·673	50·648	42·522	42·497	47·015	46·990
50·8	64·188	64·163	56·007	55·982	60·501	60·476
63·5	77·700	77·675	69·013	68·998	74·025	74·000
76·2	91·215	91·190	82·016	81·991	87·510	87·485

All dimensions in millimetres.

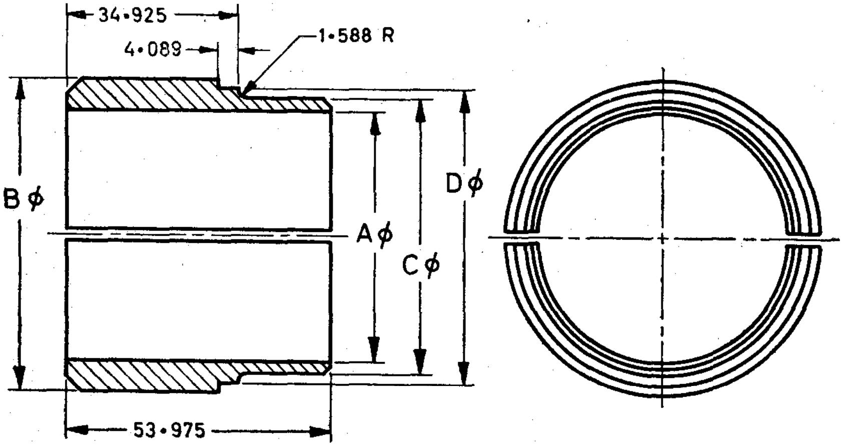
Fig. 20 Dimensions for Clamp Block Sub Assembly


A
C ϕ
D ϕ
2°
1•190
LENGTH OF ROLLER POCKETS $\frac{50{\cdot}927}{50{\cdot}673}$
TOTAL EXPANSION OF ROLLERS TO CENTRE OF FITTINGS – E ϕ
B ϕ

Outer Diameter of Pipes	*A*	*B*	*C*	*D*		*E*	No. of Rollers Required per Assembly
				Max	*Min*		
25·4	138·112	13·540	8·764	21·084	20·957	24·384	3
38·1	146·050	20·088	15·041	34·091	33·964	37·692	
50·8	146·050	22·860	17·831	46·791	46·664	49·958	
63·5	158·750	32·500	27·535	58·674	58·547	62·484	5
76·2	203·200	44·946	40·894	71·370	71·243	75·592	7

All dimensions in millimetres.

Fig. 21 Dimensions for Expander and Fittings Sub Assembly

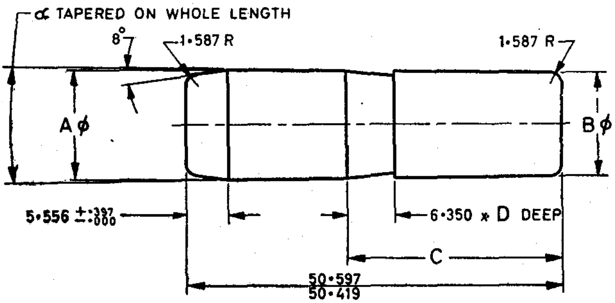


Outer Diameter of Pipes	*A*	*B*		*C*		*D*	
		Max	*Min*	*Max*	*Min*	*Max*	*Min*
25·4	25·4	37·131	37·106	29·495	29·460	33·780	33·755
38·1	38	50·648	50·623	42·497	42·472	46·990	46·965
50·8	51	64·163	64·138	55·982	55·957	60·476	60·451
63·5	63·5	77·675	77·650	68·998	68·975	74·000	73·975
76·2	76	91·190	91·165	81·991	81·966	87·485	87·460

NOTE — To be hardened.

All dimensions in millimetres.

FIG. 22 DIMENSIONS FOR SPLIT CUTTING RINGS

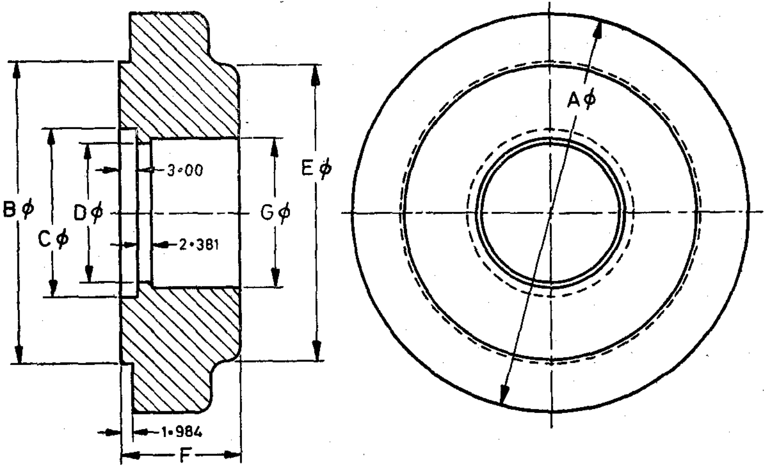

α TAPERED ON WHOLE LENGTH
8°
1·587 R
1·587 R
A ϕ
B ϕ
5·556 $^{+\cdot397}_{-\cdot000}$
6·350 × D DEEP
C
50·597
50·419

Outer Diameter of Pipes	*A*	*B*	*C*	*D*		α
				Max	*Min*	
25·4	6·325	5·556	31·353	0·203	0·178	1°
38·1	9·500	8·731	28·575	0·508	0·381	
50·8	14·732	13·919				
63·5	15·621	14·960	23·416			0°52½′
76·2		15·240	18·256			0°26′

Note — 1 Rollers are hardened, ground and polished.

Note — 2 All sharp corners to be removed.

Fig. 23 Dimensions for Rollers for Expanding Tools

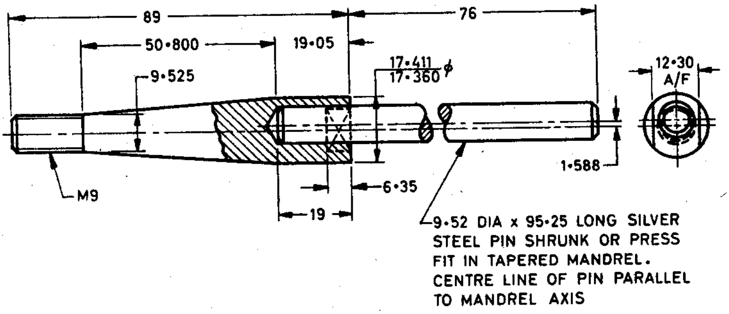


Outer Diameter of Pipes	*A*	*B*	*C*		*D*		*E*	*F*		*G*
			Max	*Min*	*Max*	*Min*		*Max*	*Min*	
25·4	69·85	52·388	29·069	29·043	24·257	24·105	50·80	20·752	20·498	25·8
38·1	73·02	65·086	42·635	42·610	36·957	36·805	63·50	19·177	18·923	37·3
50·8	85·72	77·786	56·069	56·043	49·657	49·505	76·20			50·0
63·5	98·42	90·486	69·835	69·810	61·796	61·644	88·90	14·811	14·557	62·3
76·2	111·12	103·186	82·535	82·510	74·496	74·344	111·12	9·652	9·398	75·0

Note — To be hardened.

All dimensions in millimetres.

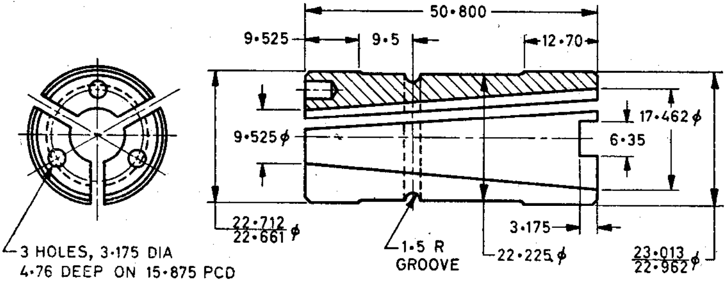
Fig. 24 Dimensions for Spigot Locating Rings



9·52 DIA x 95·25 LONG SILVER STEEL PIN SHRUNK OR PRESS FIT IN TAPERED MANDREL. CENTRE LINE OF PIN PARALLEL TO MANDREL AXIS

All dimensions in millimetres.

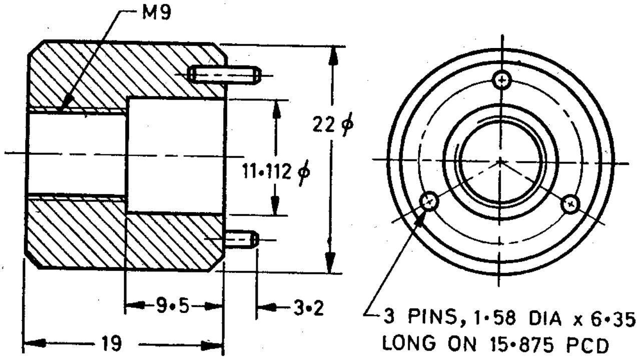
FIG. 25 DIMENSIONS FOR TAPERED MANDREL (PILOT EXPANDING BUSH FOR FACING 25·4 mm EXPANDING TYPE FITTINGS)



NOTE — Use maximum 2·4 thick saw for cutting into three equal pieces.

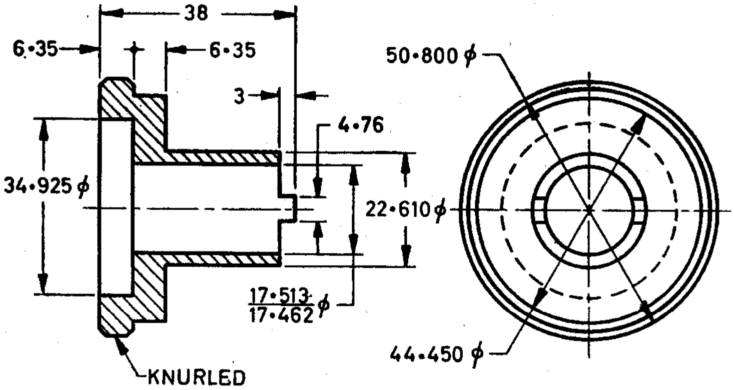
All dimensions in millimetres.

FIG. 26 DIMENSIONS FOR SPLIT BUSH (PILOT EXPANDING BUSH FOR FACING 25·4 mm EXPANDING TYPE FITTINGS)



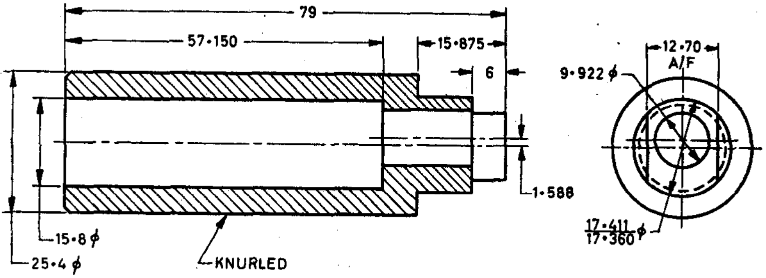
All dimensions in millimetres.

FIG. 27 DIMENSIONS FOR MILD STEEL NUT (PILOT EXPANDING BUSH FOR FACING 25·4 mm EXPANDING TYPE FITTINGS)



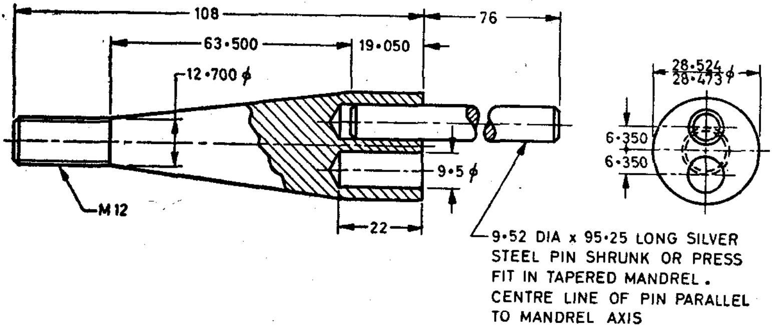
All dimensions in millimetres.

FIG. 28 DIMENSIONS FOR KNURLED SLEEVE (PILOT EXPANDING BUSH FOR FACING 25·4 mm EXPANDING TYPE FITTINGS)



All dimensions in millimetres.

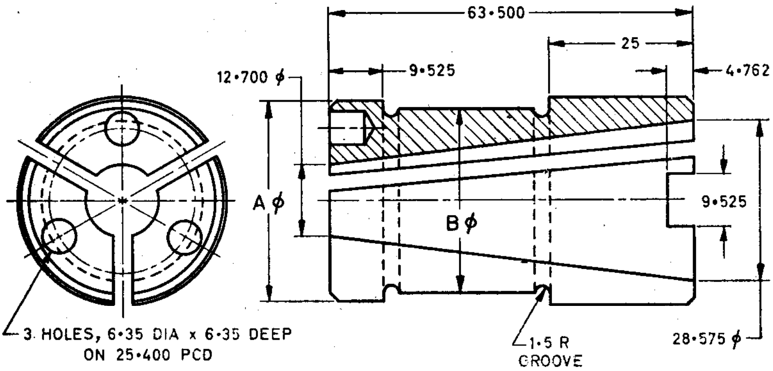
Fig. 29 Dimensions for Knurled Key (Pilot Expanding Bush for Facing 25·4 mm Expanding Type Fittings)



9·52 DIA x 95·25 LONG SILVER STEEL PIN SHRUNK OR PRESS FIT IN TAPERED MANDREL. CENTRE LINE OF PIN PARALLEL TO MANDREL AXIS

All dimensions in millimetres.

Fig. 30 Dimensions for Tapered Mandrel (Pilot Expanding Bush for Facing 38·1, 50·8, 63·5 & 76·2 mm Expanding Type Fittings)

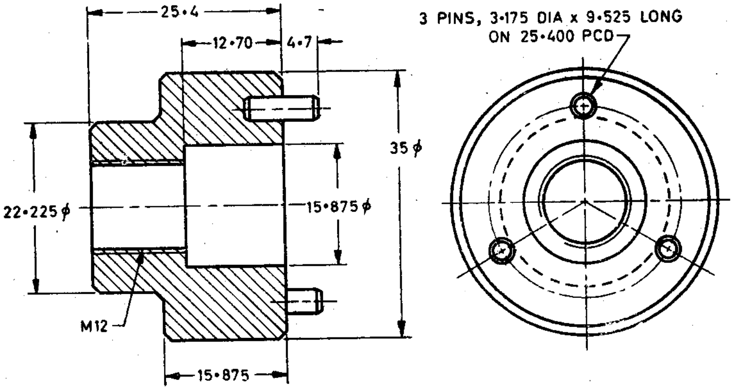


NOTE — Use maximum 3·2 thick saw for cutting into three equal pieces.

OUTER DIAMETER OF PIPES	*A*		*B*
	Max	*Min*	
38·1	35·560	35·509	32·518
50·8	48·000	47·949	44·450
63·5	59·949	59·898	57·150
76·2	72·644	72·593	69·850

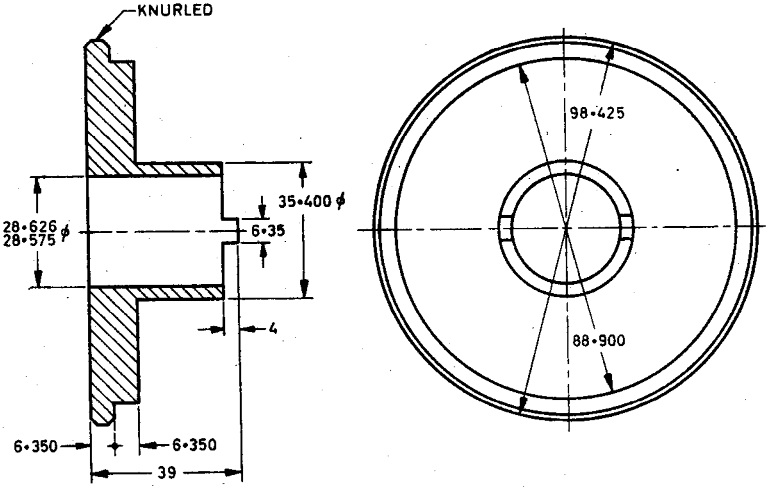
All dimensions in millimetres.

FIG. 31 DIMENSIONS FOR MILD STEEL SPLIT BUSH (PILOT EXPANDING BUSH FOR FACING 38·1, 50·8, 63·5 AND 76·2 mm EXPANDING TYPE FITTINGS)



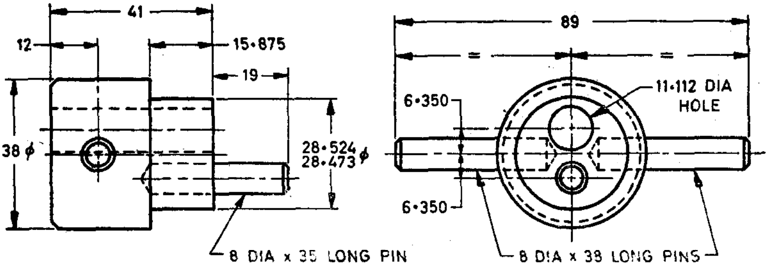
All dimensions in millimetres.

FIG. 32 DIMENSIONS FOR MILD STEEL NUT (PILOT EXPANDING BUSH FOR FACING 38·1, 50·8, 63·5 AND 76·2 mm EXPANDING TYPE FITTINGS)



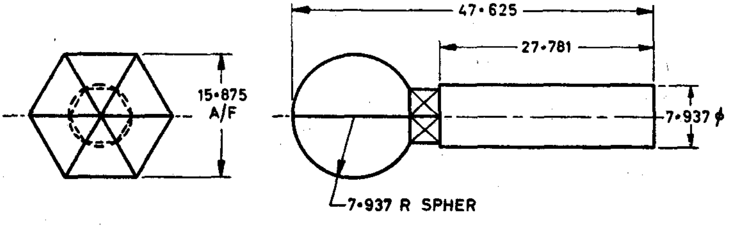
All dimensions in millimetres.

FIG. 33 DIMENSIONS FOR KNURLED SLEEVE (PILOT EXPANDING BUSH FOR FACING 38·1, 50·8, 63·5 AND 76·2 mm EXPANDING TYPE FITTINGS)



All dimensions in millimetres.

FIG. 34 DIMENSIONS FOR MILD STEEL HANDLE (PILOT EXPANDING BUSH FOR FACING 38·1, 50·8, 63·5 AND 76·2 mm EXPANDING TYPE FITTINGS)



NOTE — To be hardened.

All dimensions in millimetres.

FIG. 35 DIMENSIONS FOR SPHERICAL HEXAGONAL HEAD ADAPTOR